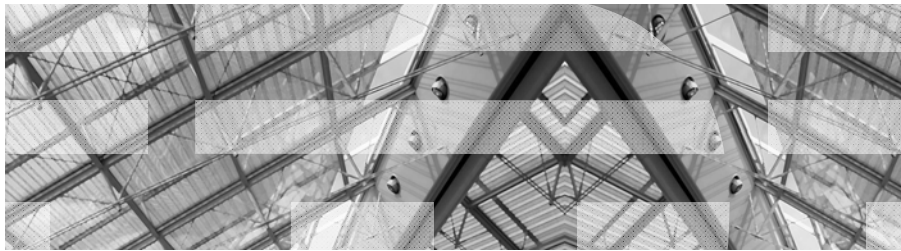# *Architectures for supporting information and analysis workloads*

Doha, November 30th 2010

Ciro Puglisi, Manager of Infrastructure Solutions
IBM Middle East and Africa
cpug@ch.ibm.com

Enterprises of all sizes are facing the challenge of managing the growth of information.....

- Rigid & siloed resources

- Performance bottlenecks

- Unacceptable downtime

- Cost and complexity of scaling

- Growing cost of space and energy

- Time-consuming, manual management tasks

4 billion camera phones sold through 2009

2.5 billion RFID tags sold in 2009

900 million GPS devices sold annually by 2013

76 million smart electric meters in 2009… 200M by 2014

2 billion people will be on the Web by 2011

IBM

Data and transaction growth increases demand for storage and server architectures for supporting data processing and analysis

A Smarter Planet demands smarter systems

Smarter Information Infrastructure
Managing information explosion

Smarter Systems for data processing
Workload optimised systems

Optimization
IBM middleware optimised for IBM Systems

Reduced complexity
Improving speed of deployment with the
Smart Analytics System

3

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There are fundamental technical challenges that need to be solved in order to affordably conquer the chaos

Information Infrastructure	**IBM offers**
Scaling flexibly	• Next generation block storage systems • Smarter use of solid state technology • Large scale, file-based storage
Improving asset utilization	• Storage Virtualization • Deduplication
Increasing operational productivity	• Simplified Device Operations • Operations and Flash Management

4
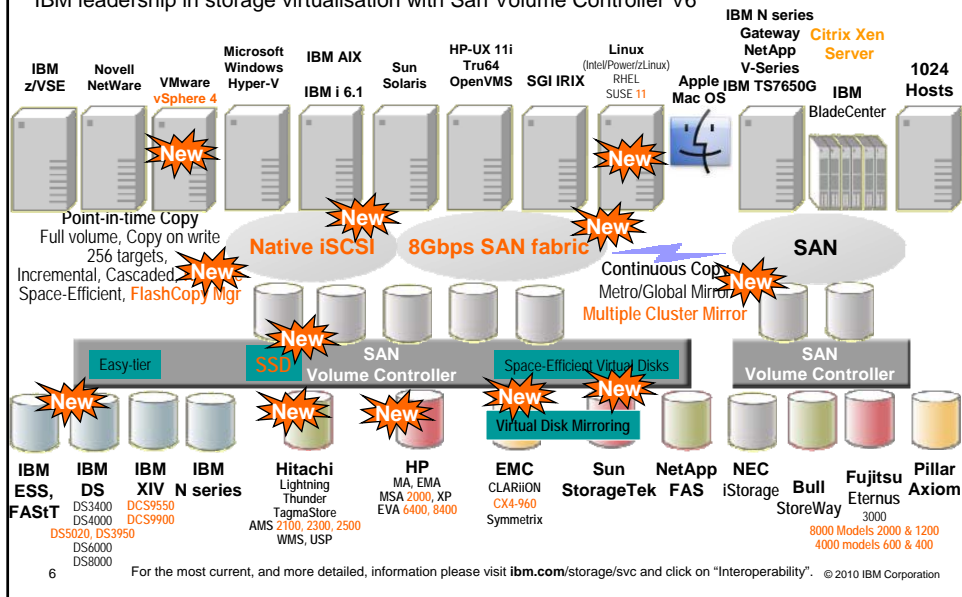
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2

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XIV: unprecedented Customer Adoption

"IBM XIV Storage System is allowing us to meet our recovery time objectives while reducing our storage total cost of ownership"
Greg Johnson, Director & CTO, IT Technology & Engineering Services, **VCU Health Systems**

"We are exceeding our SLAs and driving cost down". Maher Atwah, Ph.D. Vice President and CTO **Health Data Management Solutions (HDMS) an Aetna Subsidiary**

5

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Improving the information infrastructure's utilization

IBM leadership in storage virtualisation with San Volume Controller V6

| IBM z/VSE | Novell NetWare | VMware vSphere 4 | Microsoft Windows Hyper-V | IBM AIX IBM i 6.1 | Sun Solaris | HP-UX 11i Tru64 OpenVMS | SGI IRIX | Linux (Intel/Power/zLinux) RHEL SUSE 11 | Apple Mac OS | IBM N series Gateway NetApp V-Series IBM TS7650G | Citrix Xen Server IBM BladeCenter | 1024 Hosts |

New **New**

Point-in-time Copy
Full volume, Copy on write
256 targets,
Incremental, Cascaded
Space-Efficient, FlashCopy Mgr

Native iSCSI **8Gbps SAN fabric** **New** **New** **SAN**

Continuous Copy
Metro/Global Mirror **New**
Multiple Cluster Mirror

Easy-tier **SSD** **New** SAN Volume Controller Space-Efficient Virtual Disks **New** **New** SAN Volume Controller

New **New** **New** Virtual Disk Mirroring **New** **New**

| IBM ESS, FAStT | IBM DS | IBM XIV | IBM N series | Hitachi | HP | EMC | Sun StorageTek | NetApp FAS | NEC iStorage | Bull StoreWay | Fujitsu Eternus | Pillar Axiom |

IBM DS: DS3400, DS4000, DS5020, DS3950, DS6000, DS8000
IBM XIV: DCS9550, DCS9900
Hitachi: Lightning, Thunder, TagmaStore, AMS 2100, 2300, 2500, WMS, USP
HP: MA, EMA, MSA 2000, XP, EVA 6400, 8400
EMC: CLARiiON, CX4-960, Symmetrix
Fujitsu Eternus: 3000, 8000 Models 2000 & 1200, 4000 models 600 & 400

6   For the most current, and more detailed, information please visit **ibm.com**/storage/svc and click on "Interoperability".   © 2010 IBM Corporation

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3

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Ease of management

Visually identify hardware areas

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Different workloads have different characteristics

Database

Web and Collaborative Applications

Smarter Systems

Analytics
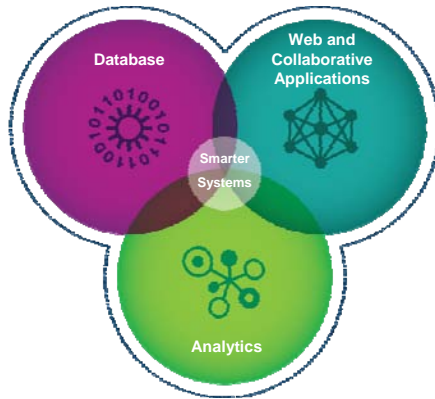
Workload optimization yields the best performance and lowest cost for each.

70% better
Consolidate Sun infrastructure to System z Linux and save. Secure data, transactions and leverage Data-Warehousing and Business Intelligence where the data resides[5]

73% better
performance using a single JVM of WebSphere on POWER7 vs. competitive application server on Nehalem[2]

50% lower cost
IBM System x running DB2 is 50% the hardware cost per ERP user as the Sun SPARC server running Oracle[3]

38% lower cost
DB2 pureScale on Power 780 has lower cost per tpm than Oracle RAC on Nehalem[1]

20-30%
Improvements in application quality and development productivity with Rational software delivery platform[4]

9

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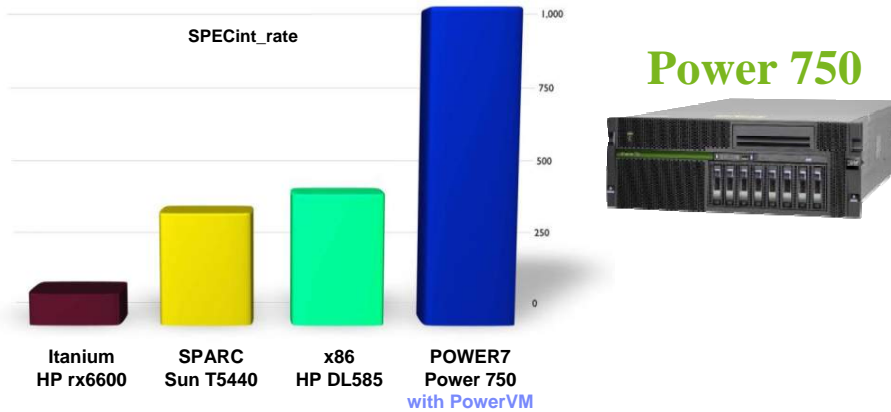## Maximize memory, minimize cost, simplify deployment

The new thinking of x

→ **5th generation** portfolio of IBM industry-leading technology

→ Expansion of **Enterprise X-Architecture to IBM BladeCenter**

→ **2X the memory capability of competitive** offerings resulting in up to 2/3 software costs

→ **Lowest costs of acquisition** and deployment for enterprise x86 computing in the industry

#1 Market share leader in scalable x86 servers

10

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The highest performing 4-socket system on the planet

**POWER7 continues to break the rules
with more performance**

SPECint_rate

				1,000
				750
				500
				250
				0

Itanium	SPARC	x86	POWER7
HP rx6600	Sun T5440	HP DL585	Power 750
			with PowerVM

Power 750

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Unparalleled flexibility and range with Power Systems

Intelligent Threads

**73% better
performance**

using a single JVM of
WebSphere on
POWER7 vs.
competitive application
server on Nehalem [2]

Database

**Web & Collaborative
Applications**

**38%
lower
cost**

DB2 pureScale on
Power 780 has
lower cost per tpm
than Oracle RAC on
Nehalem [1]

POWER7
BUILT ON
Power

TurboCore

Analytics

MaxCore

#1

Unix share WW

Active Memory Expansion
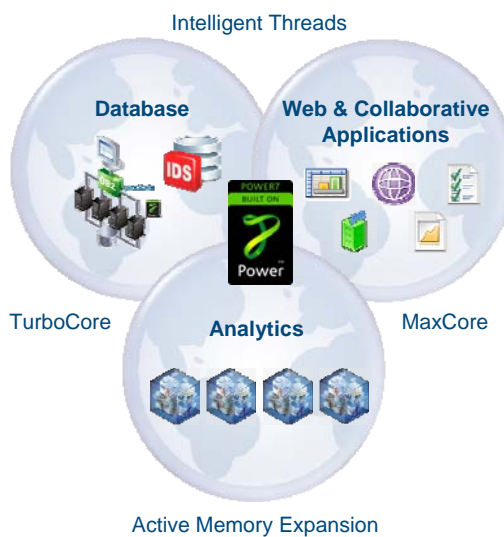
[1] DB2 pureScale scaling factor projected from IBM Internal Studies. Oracle RAC scaling factor projected from Dell Study of Oracle RAC with Infiniband. http://www.dell.com/downloads/global/power/ps2g07-20070279-Mahmood.pdf
Price per tpm includes 3-year total cost of acquisition of hardware, software, maintenance. Price does not include storage or networking
[2] Exchange on Nehalem configuration from HP's sizing tool. HP Sizer for Microsoft Exchange Server 2010 at http://h20338.www2.hp.com/ActiveAnswers/us/en/sizers/microsoft-exchange-server-2010.html
[3] As much as 40% improved throughput vs. Power6 in Tivoli portfolio for the identify duplicates process and event processing bus.

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IBM zEnterprise System – Best in Class Systems and Software Technologies
A system of systems that unifies IT for predictable service delivery

Unified management for a smarter system:
zEnterprise Unified Resource Manager

The world's fastest and most scalable system:
IBM zEnterprise™ 196 (z196)

- Part of the IBM System Director family, provides platform, hardware and workload management
- Unifies management of resources, extending IBM System z® qualities of service across the infrastructure

Scale out to a trillion instructions per second:
IBM zEnterprise BladeCenter® Extension (zBX)

- Ideal for large scale data and transaction serving and mission critical applications
- Most efficient platform for Large-scale Linux® consolidation
- Leveraging a large portfolio of z/OS® and Linux on System z applications
- Capable of massive scale up, over 50 Billion Instructions per Second (BIPS)

z/OS

z/VM

z/VSE

z/TPF

Linux

HMC

AIX

Linux

- Selected IBM POWER7® blades and IBM System x® Blades[1] for tens of thousands of AIX® and Linux applications
- High performance optimizers and appliances to accelerate time to insight and reduce cost
- Dedicated high performance private network

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1 All statements regarding IBM future direction and intent are subject to change or withdrawal without notice, and represents goals and objectives only.

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A series of successive optimizations leads to workload Optimized Systems

- **Start with best of breed components**
  - POWER Systems or System x or System z
  - IBM Systems Storage
  - WebSphere Application Server, Cognos, DB2, Infosphere

- **Optimize these components to work together on IBM Systems**
  - Deep analysis & tuning across whole stack
  - Not focused on benchmarking: realistic workloads, run in customer-typical configurations (eg. Day Trader 2.0)
  - Performance delivered out-of-the-box wherever possible
  - Focus on default tuning when software installed; less reliance on manual application of best practices

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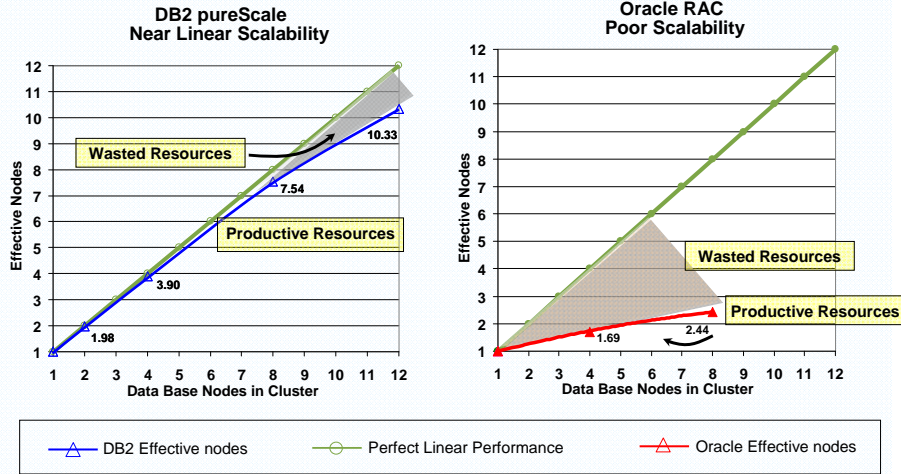## A series of successive optimizations leads to workload Optimized Systems

- **Start with best of breed components**
  - POWER Systems or System x or System z
  - IBM Systems Storage
  - WebSphere Application Server, Cognos, DB2, Infosphere

- **Optimize these components to work together on IBM Systems**

- **Integrate and tune components for a specific workload**
  - IBM pureScale Application System for transactional application platforms
    - DB2 pureScale + WebSphere + POWER7
  - IBM Smart Analytics System for business intelligence and analytics
    - Cognos + InfoSphere Warehouse + IBM Systems + DS3500

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8

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Result: best of breed + optimization = near linear scalability

DB2 pureScale
Near Linear Scalability

Oracle RAC
Poor Scalability

Wasted Resources

10.33

7.54

Productive Resources

3.90

1.98

Effective Nodes

Data Base Nodes in Cluster

Wasted Resources

Productive Resources

1.69   2.44

Effective Nodes

Data Base Nodes in Cluster

DB2 Effective nodes — Perfect Linear Performance — Oracle Effective nodes

DB2 pureScale scaling factor projected from IBM Internal Studies. Oracle RAC scaling factor projected from Dell
Study of Oracle RAC with Infiniband. http://www.dell.com/downloads/global/power/ps2q07-20070279-Mahmood.pdf

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IBM Smart Analytics System
Everything you need for Business Analytics – not just a data warehouse appliance…

Analytics Software
Business Intelligence
Cubing Services
Text Analytics & Data Mining

Powerful Data Warehouse
Warehousing Platform
Advanced Workload Management
System Automation

Hardware & Services
Flexible Server Platform Options
Modular Storage Capacity
Build, Deploy, Health Check and
Premium Support Services

Transforming information into business insight

3x **Faster -** *Workload optimized analytics run business intelligence 3x faster*

50% **less floor space**
Data compression reduces storage cost

World record performance available in *days rather than months!*

Everything you need for Business Analytics – not just a data warehouse…

IBM

IBM Smart Analytics System
Highly Flexible and Scalable

Choose the way that your IBM Smart Analytics Systems is deployed
Add capacity and analytic capabilities as your business requirements evolve

Start right	*Add analytics*	*Add capacity*

IBM SMART ANALYTICS SYSTEM

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10

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IBM Smart Analytics System
Portfolio overview

1050 New

Based on System x

…Cost-effective solutions for analytics and reporting
…Compact, appliance-like single analytics solutions
…Available for mid-market

Meeting clients where their information is…

9600

Based on System z

…Advanced query/workload management
…Database designed and optimized for system
…Disk controller, optimized to reduce data latency

2050 New

Based on System x

…Cost-effective solutions for analytics and BI
…Balance of power and simplicity out of the box
…Available for mid-market and departments within enterprises

7700 New

Based on POWER7 Servers

…Scaling to hundreds of terabytes of data
…Standard Solid State Drive – reducing data latency
…Extract insights from untapped information

5600

Based on System x

…Designed for business analytics workloads
…Growth flexibility at exceptional price-to-performance
…Optional Solid State Drive – reducing data latency

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IBM Smart Analytics System
Value proposition

	IBM Smart Analytics System	Custom
One Call support	☑ Included	
Coordinated Stack certification (SW, OS, & Firmware)	☑ Included	☒ Not Available
Services Implementation Premium Support Health Check	☑ Included ☑ Included ☑ 1st year Included	1 off 1 off 1 off
Server, Storage, SW	Power 550, DS5300, Cognos, & InfoSphere Warehouse	Power 550, DS5300, Cognos, & InfoSphere Warehouse
Bottom Line	All of the above part of the System	$ Significantly more expensive

22

11
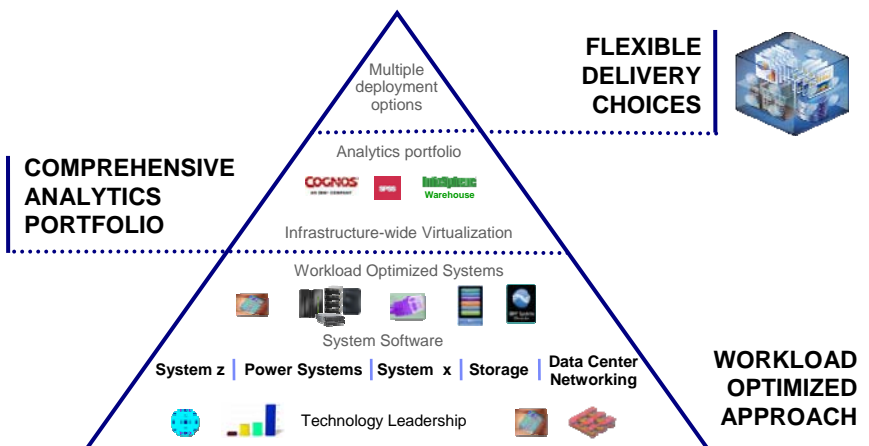
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Netezza TwinFin®

- ✓ Appliance simplicity
- ✓ Integrated database, server & storage
- ✓ 10-100x faster than traditional systems
- ✓ Purpose-built data filtering engine
- ✓ Built-in security & compliance
- ✓ Standard interfaces

PERFORMANCE • VALUE • SIMPLICITY

Focused Appliance for high performance Data Warehouse

IBM

Summary

Experience from thousands of client engagements,
our own transformation and structured architecture based on industry best practices

Multiple deployment options

FLEXIBLE DELIVERY CHOICES

Analytics portfolio

COGNOS   SPSS   InfoSphere Warehouse

COMPREHENSIVE ANALYTICS PORTFOLIO

Infrastructure-wide Virtualization

Workload Optimized Systems

System Software

System z | Power Systems | System x | Storage | Data Center Networking

WORKLOAD OPTIMIZED APPROACH

Technology Leadership

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Thank you!

ibm.com/smartersystems

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Manager of Infrastructure Solutions
IBM Middle East and Africa, cpug@ch.ibm.com

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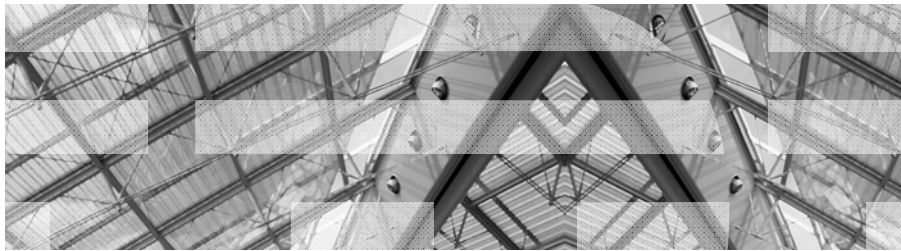
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